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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,889	02/07/2002	William E. Moerner	S00-231	8684

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EXAMINER

AL NAZER, LEITH A

ART UNIT PAPER NUMBER

2828

DATE MAILED: 12/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/071,889

Applicant(s)

MOERNER ET AL.

Examiner

Leith A Al-Nazer

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4-17,19-31,35,36 and 38-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-17,19-31,35,36 and 38-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

  
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**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 45-47 are objected to because of the following informalities:

As amended, claims 45-47 do not depend from any claims. Examiner believes that Applicant intends for claims 45-47 to depend on claim 44, as was stated on page 11 of the amendment filed on 8 September 2003. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 2, 4-17, 19-31, 35, 36, and 38-50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Independent claims 1, 16, 31, and 35 recite the term "vibronically excited level". This term is not mentioned or described in the specification.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 2, 4-17, 19-31, 35, 36, and 38-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claims 1, 16, 31, and 35 recite the term “vibronically excited level”. This term is vague and indefinite, and is not defined in the claims or the specification.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 4-17, 19-31, 35, 36, and 38-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishikawa '046.

With respect to claims 1 and 16, Ishikawa teaches a device for generating single photons one at a time at room temperature, comprising a single molecule and a light source for delivering a light pulse to the single molecule to pump the single molecule from a ground state to a vibronically excited level of the electronic excited state of the single molecule, wherein the duration of the light pulse is shorter than the relaxation time of the single molecule back to the ground state to emit the single photon from the single molecule one at a time.

With respect to claims 2, 17, and 36, Ishikawa teaches means for directing the light pulse to the single molecule (figure 20).

With respect to claims 4 and 19, Ishikawa teaches means for collecting the single photon (40, 52, 54, and 56 in figure 20).

With respect to claims 5, 6, 20, 21, 38, and 39, Ishikawa teaches a fluorescent molecule having a high quantum yield for photon emission (column 2, lines 41-52).

With respect to claims 7-10, 22-25, and 40-43, Ishikawa teaches the single molecule being a terrylene molecule, a derivative of the terrylene molecule, a dibenzoanthanthrene molecule, a derivative of the dibenzoanthanthrene molecule, a pentacene molecule, a derivative of the pentacene molecule, a perylene molecule, or a derivative of the pentacene molecule (column 1, line 65 – column 2, line 9).

With respect to claims 11, 13, 14, 26, 28, 29, 44, 46, and 47, Ishikawa teaches the single molecule in a solid host (column 1, line 65 – column 2, line 5).

With respect to claims 12, 27, and 45, Ishikawa teaches the solid host being p-terphenyl (column 2, line 1).

With respect to claims 15, 30, and 48, Ishikawa teaches the light source being a pulsed pumping laser (30).

With respect to claim 31, Ishikawa teaches a controllable source of single photons generated one at a time using optical pumping of a single molecule in a solid at room temperature (column 16, lines 17-30).

With respect to claims 35, 49, and 50, Ishikawa teaches a system for collecting single photons one at a time at room temperature, comprising a single molecule, a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state

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after which the single molecule emits the single photon, and a means for collecting the single photon (column 15, lines 10-30).

8. Claims 1, 2, 4-6, 15-17, 19-21, 30, 35, 36, 38, 39, 48, and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuhn et al.

With respect to claims 1 and 16, Kuhn teaches a device for generating single photons one at a time at room temperature, comprising a single molecule (figure 1) and a light source for delivering a light pulse to the single molecule to pump the single molecule from a ground state to a vibronically excited level of the electronic excited state of the single molecule, wherein the duration of the light pulse is shorter than the relaxation time of the single molecule back to the ground state to emit the single photon from the single molecule one at a time.

With respect to claim 2, 17, and 36, Kuhn teaches means for directing the light pulse to the single molecule.

With respect to claims 4 and 19, Kuhn teaches a means for detecting the single photon, and therefore, Kuhn inherently teaches a means for collecting the single photon.

With respect to claims 5, 6, 20, 21, 38, and 39, Kuhn teaches a fluorescent molecule having a high quantum yield for photon emission.

With respect to claims 15, 30, and 48, Kuhn teaches the light source being a pulsed pumping laser (page 373, first column – page 374, second column).

With respect to claim 35, Kuhn teaches a system for collecting single photons one at a time at room temperature, comprising a single molecule, a light source for delivering a light

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pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon, and a means for collecting the single photon.

With respect to claim 49, Kuhn teaches the means for collecting comprising an optical cavity resonator (abstract).

9. Claims 1, 2, 4-10, 15-17, 20-25, 30, 35, 36, 38-43, and 48 are rejected under 35 U.S.C. 102(b) as being anticipated by Brunel.

With respect to claims 1 and 16, Brunel teaches a device for generating single photons one at a time at room temperature, comprising a single molecule and a light source for delivering a light pulse to the single molecule to pump the single molecule from a ground state to a vibronically excited level of the electronic excited state of the single molecule, wherein the duration of the light pulse is shorter than the relaxation time of the single molecule back to the ground state to emit the single photon from the single molecule one at a time (page 2722).

With respect to claims 2, 17, and 36, Brunel teaches means for directing the light pulse to the single molecule (figure 1).

With respect to claims 4 and 19, Brunel teaches means for collecting the single photon (figure 1).

With respect to claims 5, 6, 20, 21, 38, and 39, Brunel teaches a fluorescent molecule having a high quantum yield for photon emission (page 2722, first column).

With respect to claims 7-10, 22-25, and 40-43, Brunel teaches the single molecule being a terrylene molecule, a derivative of the terrylene molecule, a dibenzoanthanthrene molecule, a derivative of the dibenzoanthanthrene molecule, a pentacene molecule, a derivative of the

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pentacene molecule, a perylene molecule, or a derivative of the pentacene molecule (page 2722, bottom of second column).

With respect to claims 15, 30, and 48, Brunel teaches the light source being a pulsed pumping laser (page 2722, bottom of first column – page 2722, top of second column).

With respect to claim 35, Kuhn teaches a system for collecting single protons one at a time at room temperature, comprising a single molecule, a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon, and a means for collecting the single photon (figure 1).

### ***Response to Arguments***

10. Applicant's arguments filed September 8, 2003 have been fully considered but they are not persuasive.

Applicant argues, "The present application teaches and claims a novel and unobvious device, method and system as a source of single photons at room temperature. The present application teaches that this is a controllable source that can deliver a single photon with a high probability." However, Applicant provides no new structural elements to distinguish the present invention over Ishikawa '046, Kuhn et al, or Brunel et al. Specifically, Applicant does not specify any element or combination of elements that are unique to the present invention and that allow the process to be carried out at room temperature. Therefore, the Examiner believes that Ishikawa, Kuhn, and Brunel would all be able to produce single photons at room temperature since they appear to include all the limitations recited in the present application.



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***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

***Communication Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leith A Al-Nazer whose telephone number is 703-305-2717. The examiner can normally be reached on Monday-Friday 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on 703-308-3098. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3329.

  
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